

**Table S3.** Natural assemblages without manipulation – details for references in the paper.  $P_{CO_2}$  is presented in units of  $\mu\text{atm}$ .  $\Omega_{\text{arag}}$  is the aragonite saturation state:  $([\text{Ca}^{2+}] \cdot [\text{CO}_3^{2-}]) / K_a$ , where  $K_a$  represents the solubility constant of aragonite  $a$ . The carbonate parameters measured within the seawater treatments (regardless of control variable) are reported. Other detail: S = salinity, I = irradiance,  $\gamma$  = photons, L:D = light:dark regime, T = temperature. n.r. = not reported or not measured

Reference	Species	Measured variable	In situ value	Measured carbon	Location	Other detail
<b>Macroalgae &amp; Seagrass</b>						
Arnold <i>et al.</i> 2012 [140]	<i>Cymodocea nodosa</i>	$P_{CO_2}$	422-4009	$P_{CO_2}$ , pH	Sicily	volcanic CO <sub>2</sub> vent, Island of Vulcano
Hendriks <i>et al.</i> 2014 [137]	<i>Posidonia oceanica</i>	pH	7.97-8.19	pH, TA	W Mediterranean, Spain	measurements: Sep 2011, Jun 2012
Johnson <i>et al.</i> 2012 [128]	<i>Patina avionis</i>	$P_{CO_2}$	276-23,095	TA, pH	Mediterranean Sea and Papua New Guinea	Sea vents; range of <i>in situ</i> values shown for temperate waters of the Mediterranean Sea
<b>Zooplankton – Pteropods</b>						
Bednarsk <i>et al.</i> 2012 [172]	<i>Limacina helicina antarctica</i>	$\Omega_{\text{arag}}$	~1.1-1.9 vs. ~0.997-2.2	DIC, TA	Southern Ocean	0-400 m depth
Bednarsk <i>et al.</i> 2014 [174]	<i>Limacina helicina</i>	$\Omega_{\text{arag}}$ (% water column undersaturated)	0-80% w/ empirical model results	DIC, TA	U.S. Pacific coast	0-200 m
Roger <i>et al.</i> 2012 [173]	<i>Cresolis acicula, Daicavolinia longirostris</i>	$\Omega_{\text{arag}}$	~3.65-3.9		North Australia	model hindcast, surface only, 1963-2009
<b>Zooplankton – Foraminifera</b>						
Moy <i>et al.</i> 2009 [145]	<i>Globigerina bulloides</i>	$P_{CO_2}$	~195 - 280		Southern Ocean	sediment cores ~50,000-5,000 y before present